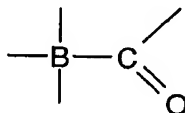


CLAIMS

1. Use of a boranocarbonate compound or ion in the manufacture of a medicament, for the stimulation of neurotransmission, vasodilation or smooth muscle relaxation by CO as a physiologically effective agent, or for the treatment of any of hypertension, radiation damage, endotoxic shock, inflammation, inflammatory-related diseases, hyperoxia-induced injury, apoptosis, cancer, transplant rejection, post-operative ileus, arteriosclerosis, post-ischemic organ damage, myocardial infarction, angina, haemorrhagic shock, sepsis, penile erectile dysfunction, adult respiratory distress syndrome, vascular restenosis, hepatic cirrhosis, cardiac hypertrophy, heart failure and ulcerative colitis or for treatment in balloon angioplasty, aortic transplantation or survival of a transplanted organ.
2. Use according to claim 1 wherein the medicament is for the stimulation of neurotransmission, vasodilation or smooth muscle relaxation by CO as a physiologically effective agent, or for the treatment of any of acute or chronic systematic hypertension, radiation damage, endotoxic shock, hyperoxia-induced injury, apoptosis, cancer, transplant rejection, post-operative ileus, arteriosclerosis, post-ischemic organ damage, angina, haemorrhagic shock, sepsis, penile erectile dysfunction, vascular restenosis, hepatic cirrhosis, cardiac hypertrophy, heart failure and ulcerative colitis or for treatment in balloon angioplasty, aortic transplantation or survival of a transplanted organ.
3. Use according to claim 1 wherein the medicament is for the stimulation of neurotransmission, vasodilation or smooth muscle relaxation by CO as a physiologically effective agent, or for the treatment of any of acute or chronic systematic hypertension, hyperoxia-induced injury, cancer by the pro-apoptotic effect of CO, transplant rejection, post-operative ileus, post-ischemic organ damage, angina, haemorrhagic shock,

penile erectile dysfunction, hepatic cirrhosis, cardiac hypertrophy, heart failure and ulcerative colitis or for treatment in balloon angioplasty or aortic transplantation.

4. Use according to any one of claims 1, 2 and 3 wherein the medicament is suitable for administration by an oral, intravenous, subcutaneous, nasal, inhalatory, intramuscular, intraperitoneal, transdermal, transmucosal or suppository route.
5. Use according to any one of claims 1 to 4 wherein the molecular structure of the boranocarbonate compound or ion includes the moiety



6. Use according to claim 5 wherein the boranocarbonate compound or ion includes the moiety  $\text{BH}_3\text{-CO-}$ .
7. Use according to claim 5 or 6 wherein the boranocarbonate is a compound or anion of the formula:



wherein:-

x is 1, 2 or 3

y is 1, 2 or 3

z is 0, 1 or 2

$x + y + z = 4$ ,

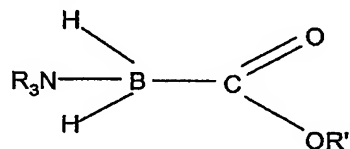
each Q is  $\text{O}^-$ , representing a carboxylate anionic form, or is OH, OR,  $\text{NH}_2$ , NHR,  $\text{NR}_2$ , SR or halogen, where the or each R is alkyl (preferably of 1 to 4 carbon atoms),

each Z is halogen,  $\text{NH}_2$ , NHR',  $\text{NR}'_2$ , SR' or OR' where the or each R' is alkyl (preferably of 1 to 4 carbon atoms).

8. Use according to claim 7 wherein z is 0.
9. Use according to claim 8 or 9 where y is 1.
10. Use according to claim 7 where x is 3.
11. Use according to any one of claims 7 to 10 where the
- 5 boranocarbonate is an anion, with at least one Q in the form of O<sup>-</sup> or OR, and the composition includes at least one metal cation.
12. Use according to claim 11 wherein the or each metal cation is an alkali metal cation or an alkaline earth metal
- 10 cation.
13. Use according to claim 12 wherein the boranocarbonate is Na<sub>2</sub>(H<sub>3</sub>BCO<sub>2</sub>).
14. Use according to any one of claims 1 to 13 wherein the medicament further includes a guanylate cyclase stimulant or
- 15 stabilizer.
15. Use according to claim 14 wherein the guanylate cyclase stimulant or stabilizer is a molecule or ion uncombined with the boranocarbonate compound or ion.
16. Use according to claim 14 or 15 wherein the guanylate
- 20 cyclase stimulant or stabilizer is YC-1.
17. Use according to any one of claims 14 to 16 wherein the medicament is adapted for one of simultaneous and sequential administration of the boranocarbonate compound or ion and the guanylate cyclase stimulant or stabilizer..
- 25 18. Use according to any one of claims 1 to 17 wherein the boranocarbonate compound or ion is other than

I. K<sub>2</sub> (H<sub>3</sub>BCOO)

II.



where R, R' = H, alkyl, perfluoroalkyl.

19. Method of treatment of a mammal comprising stimulation of neurotransmission, vasodilation or smooth muscle relaxation by CO as a physiologically effective agent, or the treatment of any of hypertension, radiation damage, endotoxic shock, inflammation, inflammatory-related diseases, hyperoxia-induced injury, apoptosis, cancer, transplant rejection, post-operative ileus, arteriosclerosis, post-ischemic organ damage, myocardial infarction, angina, haemorrhagic shock, sepsis, penile erectile dysfunction, adult respiratory distress syndrome, vascular restenosis, hepatic cirrhosis, cardiac hypertrophy, heart failure and ulcerative colitis, or treatment in balloon angioplasty, aortic transplantation or survival of a transplanted organ, by administration of a boranocarbonate compound or ion adapted to make CO available for physiological effect.

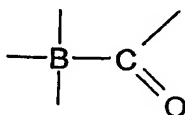
20. Method according to claim 19 comprising stimulation of neurotransmission, vasodilation or smooth muscle relaxation by CO as a physiologically effective agent, or treatment of any of acute or chronic systemic hypertension, radiation damage, endotoxic shock, hyperoxia-induced injury, apoptosis, cancer, transplant rejection, post-operative ileus, arteriosclerosis, post-ischemic organ damage, angina, haemorrhagic shock, sepsis, penile erectile dysfunction, vascular restenosis, hepatic cirrhosis, cardiac hypertrophy, heart failure and ulcerative colitis, or treatment in balloon angioplasty, aortic transplantation or survival of a transplanted organ.

21. Method according to claim 19 comprising stimulation of neurotransmission, vasodilation or smooth muscle relaxation by CO as a physiologically effective agent, or treatment of any of acute or chronic systemic hypertension, hyperoxia-induced injury, cancer by the pro-apoptotic effect of CO, transplant rejection, post-operative ileus, post-ischemic organ damage, angina, haemorrhagic shock, penile erectile dysfunction, hepatic cirrhosis, cardiac hypertrophy, heart failure and

ulcerative colitis, or treatment in balloon angioplasty or aortic transplantation.

22. Method according to any one of claims 19, 20 or 21 wherein including administration by an oral, intravenous, subcutaneous, nasal, inhalatory, intramuscular, intraperitoneal, transdermal, transmucosal or suppository route.

23. Method according to any one of claims 19 to 22 wherein the molecular structure of the boranocarbonate compound or ion includes the moiety



24. Method according to claim 23 wherein the boranocarbonate compound or ion includes the moiety  $\text{BH}_3\text{-CO-}$ .

25. Method according to claim 23 or 24 wherein the boranocarbonate is a compound or anion of the formula:



wherein:-

x is 1, 2 or 3

y is 1, 2 or 3

z is 0, 1 or 2

$x + y + z = 4$ ,

each Q is  $\text{O}^-$ , representing a carboxylate anionic form, or is OH, OR,  $\text{NH}_2$ , NHR,  $\text{NR}_2$ , SR or halogen, where the or each R is alkyl (preferably of 1 to 4 carbon atoms),

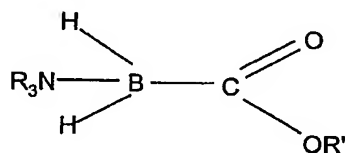
each Z is halogen,  $\text{NH}_2$ , NHR',  $\text{NR}'_2$ , SR' or OR' where the or each R' is alkyl (preferably of 1 to 4 carbon atoms).

26. Method according to claim 25 wherein z is 0.

27. Method according to claim 25 or 26 where y is 1.
28. Method according to claim 25 where x is 3.
29. Method according to any one of claims 25 to 28 where the boranocarbonate is an anion, with at least one Q in the form of O<sup>-</sup> or OR, and the composition includes at least one metal cation.
30. Method according to claim 29 wherein the or each metal cation is an alkali metal cation or an alkaline earth metal cation.
31. Method according to claim 29 wherein the boranocarbonate is Na<sub>2</sub>(H<sub>3</sub>BCO<sub>2</sub>).
32. Method according to any one of claims 19 to 31 wherein the medicament further includes a guanylate cyclase stimulant or stabilizer.
33. Method according to claim 32 wherein the guanylate cyclase stimulant or stabilizer is a molecule or ion uncombined with the boranocarbonate compound or ion.
34. Method according to claim 32 or 33 wherein the guanylate cyclase stimulant or stabilizer is YC-1.
35. Method according to any one of claims 32 to 34 comprising simultaneous or sequential administration of the boranocarbonate compound or ion and the guanylate cyclase stimulant or stabilizer.
36. Use according to any one of claims 19 to 35 wherein the boranocarbonate compound or ion is other than

I. K<sub>2</sub> (H<sub>3</sub>BCOO)

II.



where R, R' = H, alkyl, perfluoroalkyl.

37. A method of treating a viable mammalian organ extracorporeally or an isolated mammalian organ, comprising

contacting the organ with a pharmaceutical composition comprising a boranocarbonate compound or ion adapted to make CO available for physiological effect.

38. A method according to claim 37 wherein the  
5 boranocarbonate compound or ion is as defined in any one of claims 5 to 13.

39. Method according to claim 38 or 39 wherein the composition further includes a guanylate cyclase stimulant or stabilizer.

40. Method according to claim 39 wherein the guanylate  
10 cyclase stimulant or stabilizer is a molecule or ion uncombined with the boranocarbonate compound or ion.

41. Method according to claim 39 or 40 wherein the guanylate cyclase stimulant or stabilizer is YC-1.

42. A medical or veterinary implant carrying, in a form  
15 releasable at the implant site, a boranocarbonate compound or ion adapted to make CO available for physiological effect.

43. An implant according to claim 38 wherein the boranocarbonate compound or ion is as defined in any one of claims 5 to 13.

44. An implant according to claim 42 or 43 wherein the medicament  
20 further includes a guanylate cyclase stimulant or stabilizer.

45. An implant according to claim 44 wherein the guanylate cyclase stimulant or stabilizer is a molecule or ion uncombined with the boranocarbonate compound or ion.

46. An implant according to claim 44 or 45 wherein the  
25 guanylate cyclase stimulant or stabilizer is YC-1.

47. A method of introducing CO to a mammal as a therapeutic agent comprising:

- a) administering a boranocarbonate which makes  
30 available CO suitable for physiological effect; and  
b) administering a guanylate cyclase stimulant or stabiliser.

48. A method according to claim 47, which is for the stimulation of neurotransmission, vasodilation or smooth  
35 muscle relaxation by CO as a physiologically effective agent,

or for the treatment of any of hypertension, radiation damage, endotoxic shock, inflammation, inflammatory-related diseases, hyperoxia-induced injury, apoptosis, cancer, transplant rejection, post-operative ileus, arteriosclerosis, post-  
5 ischemic organ damage, myocardial infarction, angina, haemorrhagic shock, sepsis, penile erectile dysfunction, adult respiratory distress syndrome, vascular restenosis, hepatic cirrhosis, cardiac hypertrophy, heart failure and ulcerative colitis or for treatment in balloon angioplasty, aortic  
10 transplantation or survival of a transplanted organ.

49. A method according to claim 47, which is for the stimulation of neurotransmission, vasodilation or smooth muscle relaxation by CO as a physiologically effective agent, or for the treatment of any of acute or chronic systematic  
15 hypertension, radiation damage, endotoxic shock, hyperoxia-induced injury, apoptosis, cancer, transplant rejection, post-operative ileus, arteriosclerosis, post-ischemic organ damage, angina, haemorrhagic shock, sepsis, penile erectile dysfunction, vascular restenosis, hepatic cirrhosis, cardiac  
20 hypertrophy, heart failure and ulcerative colitis or for treatment in balloon angioplasty, aortic transplantation or survival of a transplanted organ.

50. A method according to claim 47, which for the stimulation of neurotransmission, vasodilation or smooth muscle relaxation  
25 by CO as a physiologically effective agent, or for the treatment of any of acute or chronic systematic hypertension, hyperoxia-induced injury, cancer by the pro-apoptotic effect of CO, transplant rejection, post-operative ileus, post-ischemic organ damage, angina, haemorrhagic shock, penile  
30 erectile dysfunction, hepatic cirrhosis, cardiac hypertrophy, heart failure and ulcerative colitis or for treatment in balloon angioplasty or aortic transplantation.

51. A method according to claim 47, which is for treatment of  
35 any of acute or chronic systemic hypertension, pulmonary hypertension, transplant rejection, post-operative ileus,



arteriosclerosis, post-ischemic organ damage, myocardial infarction, penile erectile dysfunction, vascular restenosis, hepatic cirrhosis, cardiac hypertrophy, heart failure, chronic anal fissure, internal anal sphincter disease, anorectal  
5 disease, and ulcerative colitis or for treatment in balloon angioplasty or aortic transplantation.

52. A method according to any one of claims 47 to 51 wherein the boranocarbonate compound or ion is as defined in any one of claims 5 to 13.

10 53. A method according to any one of claim 47 to 52 wherein the guanylate cyclase stimulant or stabilizer is a molecule or ion uncombined with the boranocarbonate compound or ion.

54. A method according to any one of claims 47 to 53 wherein the guanylate cyclase stimulant or stabilizer is YC-1.

15 55. A pharmaceutical composition comprising:

a) a boranocarbonate compound or ion which makes available CO suitable for physiological effect; and

b) a guanylate cyclase stimulant or stabiliser.

20 56. A composition according to claim 55 wherein the boranocarbonate compound or ion is as defined in any one of claims 5 to 13.

57. A composition according to claim 55 or 56 wherein the guanylate cyclase stimulant or stabilizer is a molecule or ion uncombined with the boranocarbonate compound or ion.

25 58. A composition according to any one of claims 55 to 57 wherein the guanylate cyclase stimulant or stabilizer is YC-1.

59. A composition according to any one of claims 55 to 58, adapted for one of simultaneous and sequential administration of the boranocarbonate compound or ion and the guanylate  
30 cyclase stimulant or stabilizer.